

Appl. No. 10/507,100  
Amdt. dated December 30, 2005  
Reply to Office action of September 30, 2005  
Atty. Docket No. AP928USN

### Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

1. (Currently amended) A photosensitive material comprising at least one organic species in ~~an organic-inorganic~~ a host matrix, the at least one organic species comprising a material having a refractive index which changes upon exposure to actinic radiation, wherein the host matrix comprises a material formed by interpenetrating networks and inorganic and organically-modified phases.

2. (Currently amended) A photosensitive material according to claim 1, wherein the organic species comprises one or more of efficient organic photosensitive and photoinitiating species together with a monomer or a mixture of monomers and the host matrix comprises interpenetrating inorganic and organically-modified networks with the organic species dispersed therein or chemically-bonded thereto, or both dispersed therein and chemically-bonded thereto.

3 - 6. (Cancelled)

7. (Previously presented) A photosensitive material according to claim 1, wherein the photosensitive material comprises a product of a sol-gel process.

8. (Previously presented) A photosensitive material according to claim 1, wherein the organic species is selected from the group comprising halogen-substituted acetophenones, chromophore-substituted triazines, azo dyes, benzoin ethers, ketals, o-acylated oximino ketones, acyl phosphine oxides, aromatic ketones, hexaaryl-bisimidazoles, bis(p-dialkylaminobenzilidene) ketones, thioxanthenes, ketocoumarins, 9-phenylacridine, die-sensitized systems such as xantene, acridinium, phenazine and thiazine dyes in combination with activators such as amines, sulfinates, enolates, carboxylates and organotin compounds, dye-borate complexes, ferrocenium salts, aluminate complexes, protic acid generators such as sulfonium or iodonium salts capable of initiating cationic polymerization, and organometallic systems such as dicyclopentadienyltitanocenes, in particular bis(pentafluorophenyl)titanocene, titanocene/N-phenylglycine, and bis( $\mu^5$ -2,4-cyclopentadien-1-yl)-bis-[2,6-difluoro-3-(1H-pyrrol-1-yl)phenyl]titanium; and bis(p-dialkylaminobenzilidene) ketones in combination with a hexaaryl-bisimidazole initiating system with charge transfer agents such as 2-mercaptobenzoxazole.

Appl. No. 10/507,100  
Amdt. dated December 30, 2005  
Reply to Office action of September 30, 2005  
Atty. Docket No. AP928USN

9. (Currently amended) A photosensitive material according to claim 1, wherein the organic species is selected from the monomers capable of ~~free radical or cationic~~ polymerization [~~respectively~~] and ethylenically unsaturated monomers capable of free radical addition polymerization.

10 - 12. (Cancelled)

13. (Currently amended) A photosensitive material according to claim 10, wherein the monomers are selected from the group comprising phenyl acrylate, 2-phenoxyethyl acrylate, N-vinylcarbazol, 3,6-dibromo-9-vinyl carbazol, p-chlorophenyl acrylate, hexanediol diacrylate, vinyl benzoate, tert-butyl hydroperoxide, hexanediol diacrylate, 2,4,6-tribromophenyl acrylate, phenyl acrylate, orthobiphenyl acrylate, orthobiphenyl methacrylate, di(2-acryloxyethyl) ether of bisphenol-A, 2-phenylethyl acrylate, di(p-chlorophenoxy)ethyl acrylate, and pentachlorophenyl acrylate, ethylene glycol diacrylate, diethylen glycol diacrylate, 1,4-butanediol diacrylate, decamethylene glycon diacrylate, 1,4-cyclohexanediol diacrylate, glycerol diacrylate, glycerol triacrylate, ethylene glycol dimethacrylate, butylene glycol dimethacrylate, tripropylene glycol diacrylate, di(2-acryloxyethyl) ether of bisphenol-A, di(2-acryloxyethyl) ether of tetrabromo-bisphenol-A, and monomers that have two or more cyclohexene oxide groups linked through siloxane chain segments, including 1,3-bis[2-(3{7-oxabicyclo[4.1.0]heptyl})ethyl]-tetramethyl disiloxane.

14 - 17. (Cancelled)

18. (Currently amended) A material according to claim 1, wherein the host ~~organic-inorganic~~ matrix comprises a material synthesized using organo alkoxysilanes as one or more of the precursors for a sol-gel reaction in which organic groups are introduced within an inorganic network through the  $\equiv Si-C-$  bond.

19. (Currently amended) A material according to claim 1, wherein the host matrix material comprises, in the presence of dispersed photosensitive, photoinitiating and photopolymerizable species, copolymerized epoxysilanes interpenetrating networks obtained by copolymerization of an epoxysilane and either or both of a tetraalkoxysilane and a trialkoxysilane.

20. (Previously presented) A material according to claim 19, wherein the epoxysilane is a (3-glycidoxypropyl)-trialkoxysilane.

21 - 28 (Cancelled)

Appl. No. 10/507,100  
Amdt. dated December 30, 2005  
Reply to Office action of September 30, 2005  
Any. Docket No. AP928USN

29. (Currently amended) A material according to claim 1, wherein the ~~organic-inorganic~~ matrix comprises a material formed as an ~~organic~~ organically modified network within an inorganic network by either photochemical or thermal curing thereof using ~~triethoxysilane~~ a tetraalkoxysilane and either or both of trialkoxysilane  $R'Si(OR)_3$  or diethoxysilanes and dialkoxysilanes  $R'R''Si(OR)_2$  as the precursor with R' and R'' being a polymerizable group such as an epoxy group.

30. (Currently amended) A material according to claim 1, wherein the ~~organic-inorganic~~ matrix comprises a material formed as ~~inorganic/organic~~ simultaneous interpenetrating networks, where both inorganic glass phase and ~~polymer formation~~ organically modified phase formations occur concurrently.

31. (Cancelled)

32. (Currently amended) A process of making a photosensitive material comprising the steps of forming an ~~organic-inorganic~~ a host matrix containing at least one organic species having a refractive index that changes on exposure to actinic radiation, wherein the host matrix is formed by interpenetrating networks of inorganic and organically-modified phases.

33. (Previously presented) A process according to claim 32, wherein the process comprises a sol-gel process.

34. (Previously amended) A process according to claim 32, wherein the organic-inorganic matrix is synthesized using organo alkoxysilanes as one or more of the precursors for a sol-gel reaction in which organic groups are introduced within an inorganic network through the  $\equiv Si-C-$  bond.

35. (Currently amended) A process according to claim 32, wherein the matrix material is formed by copolymerization of an epoxysilane ~~epoxysilanes~~ and either or both of a tetraalkoxysilane and a trialkoxysilane in the presence of dispersed photosensitive, photoinitiating and photopolymerizable species.

36. (Previously presented) A process according to claim 35, wherein the epoxysilane used is a (3-glycidoxypopyl) trialkoxysilane.

37 - 43. (Cancelled)

44. (Currently amended) A process according to claim 32, wherein the organic-inorganic matrix

Appl. No. 10/507,100  
Amtd. dated December 30, 2005  
Reply to Office action of September 30, 2005  
Atty. Docket No. AP928USN

material is formed as an ~~organic organically modified~~ network within the inorganic network by either photochemical or thermal curing ~~thereof of such groups using triethoxysilane a tetraalkoxysilane and either or both of trialkoxysilane~~  $R'Si(OR)_3$  or ~~diethoxysilanes and dialkoxysilanes~~  $R'R''Si(OR)_2$  as the precursor with R' and R'' being a polymerizable group such as an epoxy group.

45. (Currently amended) A process according to claim 32, wherein the organic-inorganic matrix material is formed as ~~inorganic-organic~~ simultaneous interpenetrating networks, where both inorganic glass phase and ~~polymer formation~~ organically modified phase formations occur concurrently.

46. (Cancelled)

47. (Previously presented) A process according to claim 32, comprising the step of employing polymerizable monomers as the cosolvents such that all the components contribute either to the inorganic network or to the organic polymer.

48. (Cancelled)

49. (New) A photosensitive material according to claim 1, wherein the host matrix is prepared by co-polymerization of sol-gel precursors of inorganic and organically modified networks.

50. (New) A material according to claim 1, wherein the host matrix material comprises, in the presence of dispersed photosensitive, photoinitiating and photopolymerizable species, interpenetrating networks obtained by copolymerization of a tetraalkoxysilane and a trialkoxysilane.

51. (New) A process according to claim 32, wherein the host matrix is prepared by copolymerization of sol-gel precursors of inorganic and organically -modified networks.

52. (New) A process according to claim 32, wherein the matrix is formed by copolymerization of a tetraalkoxysilane and a trialkoxysilane in the presence of dispersed photosensitive, photoinitiating and photopolymerizable species.